CLAIM AMENDMENTS

IN THE CLAIMS:

Claim 1 (currently amended): A real time method for estimating of the conditional probability distribution for the current and future state of a non-linear random dynamic signal process, the method comprising:

providing measurement sensing of sampled data associated with the state of said signal process at a sampled instant of time *t* under consideration,

creating state data for ~~parties~~ particles that probabilistically resemble the state of said signal process,

calculating branching values for each of said particles of state data at each new instant of time, sampled data is provided by ~~said~~ sensors,

selectively duplicating the state data of said particle's data in accordance with branching value criteria,

selectively deleting the state data of particles of said sampled data in accordance with branching value criteria, and

undertaking in accordance with said branching value calculations, the following actions:

scaling said branching values with measurement noise so as to reduce duplications and deletions of state data as the effect of the measurement noise increases,

dividing the collection of said particle state data by the number of particles to provide an estimate of a conditional probability distribution of said signal process at the time of the most recent measurement, and

repeatedly computing estimates of said conditional probability distribution base upon the arrival of new sampled data at subsequent sampled instants of time $t + n$.

Claim 2 (currently amended): A method as claimed in Claim 1, wherein said method further comprises: estimating the joint conditional probability that said signal process will be represented by any set of possible paths at various past and current instants of time, and ~~by~~ employing sampled data obtained up to the current time to estimate probabilistically said particle paths[,] .

Claim 3 (currently amended): A method as in Claim 1, wherein the number of particles are renormalized by selecting a random set ~~or~~ <u>of</u> particle state data to either duplicate, or delete particles of said state data.

Claim 4 (currently amended): A method as in Claim 1, wherein said method further comprises estimating the joint conditional probability tat said signal process will be represented by any set of possible paths at various ~~part~~ <u>past</u>, current, and future instants of time given the sampled data up to the current time by assigning the weight of one divided by the current number of particles to each of said paths with common ancestors being counted in each of said paths that they are in.

Claim 5 (original): A method as claimed in Claim 1, wherein said method further comprises: storing data for particle paths through use of ancestor particle sate data where an ancestor particle represents a previous particle state and can be an ancestor to more than one particle due to branching,

Associating state data with ancestor sampled data to store integer weight values for ancestral sampled data, which are related to a given ancestral particle, wherein the integer weight represents the number of non-ancestral particles, which are related to said given ancestral particles,

Incrementing or decrementing the integer weight for the state data of ancestor particles of sampled data, in accordance with the number of related non-ancestral particles, and deleting any ancestor particle of sampled data which as a weight of zero.

Claim 6 (original): A method as claimed in Claim 5, wherein intermediate ancestor state data are generated at specific selected instances of time in order to facilitate the calculation of asymptotically optimal smoothing filters.

Claim 7 (original): A method as claimed in Claim 6, wherein ancestor state data are discarded when the most recent measurement time is greater than a defined span of time from the creation of said given ancestor particle.

Claim 8 (cancelled)